

5.027 Impact of aerosols on regional climate in southern and northern China during strong/weak East Asian summer monsoon years.

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Abstract:

In this work, we mainly simulate the effects of aerosols on regional climate in southern (SC) and northern China (NC), and compares the differences of aerosol climatic effects in strong/weak summer monsoon years with a modified regional climate model RegCM4. The results show that the total climatic effects of aerosols cause the decline of averaged air temperature and precipitation of SC and NC in summer. In NC, the strength of temperature drop in strong summer monsoon years is higher than that in weak summer monsoon years, indicating the possible impact from the different changes of radiation, circulation, and precipitation. The decrease of precipitation is more significant in NC in weak summer monsoon years, while it is stronger in SC in strong summer monsoon years due to the difference of aerosol distribution as well as the effects on circulation and cloud microphysics processes. Besides, aerosol effects also cause a decrease of zonal wind at 850hPa in SC and an increase in NC. The cooling center is more northerly and stronger in strong monsoon year, while it is more southerly and weaker in weak summer monsoon years, which results in the differences of vertical circulation anomaly and meridional wind anomaly at 850hPa. In weak summer monsoon years, meridional wind at 850hPa is increased in NC, while it is found to be decreased in SC. In strong summer monsoon years, meridional winds at 850hPa in both NC and SC are weakened. However, the decrease in SC is much more distinctly and clearly.